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ABSTRACT

The operation and maintenance (O&M) of public school buildings and equipment has become more complex over the years, requiring increased training of personnel, more responsible management, and greater expenditure of school resources. This monograph provides basic guidelines for establishing a program to respond to these administrative concerns. The monograph first introduces its subject, stressing the differences between operations and maintenance. The body of the monograph is divided into three major sections. The first of these deals with establishing an O&M program. Topics include the development of policy statements, job descriptions and titles, employee training, organization of work schedules, and personnel evaluation. The second section focuses on custodial staffing. Several custodial workload formulas are discussed to aid administrators in determining the number of custodians needed for each school building. The final section contains data from the Wisconsin Department of Public Instruction's 1984 cost study of O&M programs. Mean figures for the state are listed, as are figures from national studies. The appendix contains a list of training workshops for O&M personnel and worksheets for computing both the number of custodians needed and local O&M costs for comparison with state figures. An annotated bibliography is also appended. (PGD)

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Suggestions for Establishing an Operations and Maintenance
Program and Conducting a Cost Study

Monograph 1

May 1985

EA 018 222

**THE OPERATION AND
MAINTENANCE OF OUR SCHOOLS**

**WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION
HERBERT J. GROVER, STATE SUPERINTENDENT**

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Bulletin No. 5386

**THE OPERATION AND
MAINTENANCE OF OUR SCHOOLS**

Monograph I

**Suggestions for Establishing an Operations and Maintenance
Program and Conducting a Cost Study**

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OVERVIEW

INTRODUCTION

Billions of dollars are invested in the land, buildings, and equipment of our public schools. Over the years the operation and maintenance of this property has become more complex, requiring increased training of personnel, more responsible management and more money. This is the first in a series of monographs designed to aid administrators, buildings and grounds supervisors, and other operations and maintenance (O & M) personnel in their important task.

Schools need effective O & M programs for several reasons. First, clean, well maintained facilities and equipment provide a safe environment for students and teachers. Secondly, they preserve the life of a district's buildings and equipment, which in turn results in a savings for taxpayers. In addition, the cleanliness of school buildings affects the morale of students, teachers, and visitors.

O & M STATISTICS

In 1983-84 public school districts in Wisconsin spent almost \$308 million on the operation and maintenance of their schools, or approximately \$712,473 per district. This accounts for 12.4% of the total spent on general operations, defined by the WESSAS Accounting System as the total expenditures of the General Fund. This breaks down to an average of \$415.67 per pupil for O & M.

The O & M of our schools is also big business in terms of the number of people employed. Last year there were approximately 6,700 O & M personnel in our state's public schools. This means that there was one O & M employee for every 110 students.

O & M DEFINED

Unfortunately, many administrators unfamiliar with the work of their O & M personnel do not differentiate the job titles and tasks of their operations personnel from their maintenance personnel. These people have different skills and perform different duties. Their job descriptions and salaries should reflect this, as should the school's annual budget for O & M expenses.

In many small districts, however, operations and maintenance work is done by a single individual, the school custodian. Because of this dual responsibility and the current lack of discrimination in data submitted to the DPI, we have combined all O & M data and shall refer to them collectively. We have defined below operations and maintenance in the hopes that they will be differentiated in future reports.

Operations is concerned with those activities that keep the physical plant open, comfortable, and safe for use. It includes such things as operating the heating, lighting, and ventilating systems; snow removal; changing a light bulb; the servicing of vehicles (not pupil transportation vehicles); activities concerned with safety; and the cleaning of buildings, equipment, and grounds (DPI, 1984). Payment for custodial services represents most of the funds spent on the operation of school buildings. Much of the operations work is done without special tools for dismantling or adjusting.

Maintenance costs are directly affected by operation policies and procedures. Maintenance is concerned with "... keeping the grounds, buildings, and equipment in effective working condition and state of repair" (DPI, 1984). Repairing blacktop, furniture, and vehicles are all acts of maintenance. One method of holding down repair costs is the practice of preventive maintenance. This is defined by the Maryland Department of Educational Accountability (1980) as:

... planned maintenance and includes all work designed to prevent deterioration or malfunction of facilities and equipment. An adequate program of preventive maintenance extends the functional life of buildings and equipment, reduces the need for repairs, heads off emergencies, and reduces costs (p. 70).

Installing a new heating element in an electric water heater is an act of maintenance. Annual floor refinishing, monthly oiling of furnace parts, and periodic replacement of all faucet washers are acts of preventive maintenance.

MONOGRAPH CONTENTS

- A. The first section deals with establishing an O & M program. Topics include the development of policy statements, job descriptions and titles, employee training, organization of work schedules, and personnel evaluation.
- B. This section focuses on custodial staffing. Several custodial work load formulas are discussed to aid administrators in determining the number of custodians needed for each school building.
- C. The final section contains data from the DPI's cost study of O & M programs. Mean figures for the state are listed, as are figures from national studies.

The appendix contains a list of some training workshops for O & M personnel, worksheets to compute the number of custodians needed under the Pattington Formula and local O & M costs for comparison with state figures, and an annotated bibliography.

A. ESTABLISHING YOUR O & M PROGRAM

POLICY STATEMENTS

Following good management practice, it is recommended that school boards adopt a policy for their operations and maintenance program. This should be a written statement, acceptable to the administration, teachers, and other staff, concerning the goals and services of the O & M personnel.

The Illinois Association of School Boards, in its excellent resource book The New Good School Maintenance (1984) suggested that these items be included in policy statements:

- * Schools shall be as well-maintained and attractive as possible. Adequate staff, equipment, and supplies shall be provided.
- * There shall be a fair workload for each employee.
- * It is expected that all employees exhibit pride in their work, demonstrate initiative, and act professionally.
- * The O & M staff shall receive directions, supervision, and adequate training.
- * The services of an architect, engineer, or other specialist may be utilized on a contract basis for consultation or maintenance work when needed. The superintendent shall submit to the board a description of these special needs. The board will authorize bidding when required.
- * A clean and orderly school is the responsibility of all staff members and students. This requires cooperation and the development of cleanliness standards and habits by all people using school facilities.
- * Requests for special custodial and maintenance services shall be made to the custodial supervisor.
- * Policy shall be made concerning the locking of doors, lost and found items, use of custodial equipment, and the use of telephones and other school property.
- * Custodians should not be requested to run errands or perform other unrelated tasks.

The board's policy statement should be distributed to all persons using school facilities and to O & M job applicants.

JOB DESCRIPTIONS AND TITLES

An important part of making policy and professionalizing a job is the formation of job titles and descriptions. The title should reflect the program and responsibilities of the staff person. This task has historically been neglected in the area of operations and maintenance. Some schools, for example, have modernized the titles of their O & M personnel without changing their responsibilities, while other schools have changed the responsibilities but not the job titles. As schools have grown larger and more complex, the need for clearer titles has increased (Worrell, 1972).

Job descriptions give the requirements of a job. They provide a basis for personnel selection, training, and assessment. Descriptions usually include a general statement of responsibilities, a list of specific duties, and minimum qualifications required. Descriptions may, in addition, give details of supervision and wage scales.

Sample job titles and general statements of responsibility are listed below (NYC Board of Education, 1977). The actual statements of responsibility used by a school should fit the needs of the system and be more detailed than those listed.

Director of Building and Grounds: To coordinate custodial and maintenance activities; to develop and control O & M budgets for each school; to be responsible for all O & M personnel in the schools.

Custodial Supervisor: To evaluate the performance of each custodian in the building; to coordinate work activities with administrators and teachers; to be responsible for records, reports, supplies, requisitions, storage and movement of equipment.

Custodian: To be the on-site manager of the physical operation and minor maintenance of a school and its grounds.

Housekeeper: To do such operations as sweeping, mopping, dusting, sanitizing, vacuuming, and other cleaning tasks.

TRAINING

Another vital step in developing an O & M program is training and retraining your O & M staff. New employees need extensive training on the use and storage of equipment and supplies, procedures, and work schedules. Most custodians can also be trained to maintain sites and perform preventative maintenance tasks. When new supplies, equipment, or facilities are brought into a system, in-service workshops should be provided to train the O & M staff.

Several manufacturers, universities, and organizations hold institutes for training O & M staff in the use of supplies, equipment, and new procedures. Although the institutes are initially somewhat costly, increased training should save a school money by teaching time-saving, efficient techniques. Appendix A contains a list of some well known institutes.

ORGANIZATION

The next step is to organize time and people. First one must determine the cleaning tasks which need to be done in each room and the frequency of each task. A chart such as the one on the next page is helpful in organizing the information (IASB, 1984).

There are many ways in which personnel can then be assigned to tasks. The supervisor may coordinate work crews and assign them to work stations. Some authors suggest that custodians work separately, each in a different part of the building, performing all tasks in his/her area (Abramson, 1983).

FREQUENCY CHART FOR CUSTODIAL WORK										
TASKS										
ROOMS	Dry Mop	Wet Mop	Refinish Floor	Vacuum Carpet	Clean Windows, Interior	Clean Windows, Exterior	Clean Light Fixtures	Dust Furniture	Wax Furniture	Wash Walls
Classrooms										
Offices										
Gym										
Locker Rooms										
Restrooms										
Hallways										

Supervisors must create a legend (e.g. 1W = once per week, 2W = twice per week, A = annually, A4 = every four years, etc.) and insert the frequency of each task into the chart.

After assignments are made, supervisors should give each worker a written plan stating the work schedule. Time should be allowed in the schedule to do non-routine work and minor maintenance.

PERSONNEL EVALUATION

O & M personnel should be evaluated from time to time with the intention of helping them improve their work. The best way to evaluate is to visit the work sites. A work inspection form may be used to report the quality of work of each employee (IASB, 1984). It should include such things as condition of equipment and supplies, adherence to safety regulations, cleanliness of site, quantity of work accomplished, and suggestions for improvement.

FACILITY APPRAISAL

An important step in every O & M program should be the annual inspection of all buildings and equipment. The appraisal is useful for long-and short-term budgeting and for evaluating the maintenance program.

Facility appraisal will be the subject of Monograph 2 in our series on operations and maintenance.

B. CUSTODIAL STAFFING

During the last fifty years more than a half-dozen custodial workload formulas have been developed. Although they have several elements in common, they approach the problem differently. Three general classifications of these formulas can be made.

The first classification is based on time study techniques. This approach, first used by industries in the 1920s and '30s, requires a listing of every custodial job expected to be performed and an assessment of the number of minutes required to perform each task. Daily time requirements are determined by adding the time elements for all jobs. Weekly time requirements are then found, from which the number of custodians is determined based on a 40-hour work week per custodian (Worrell, 1972). This method may be useful in very large schools in which there is strict division of labor, to the extent that each custodian performs a single task many times daily. However, for reasons of personnel morale and job satisfaction, such structuring of tasks is not recommended, nor is the use of this time consuming staffing method.

The second classification of custodial staffing is based on room equivalents (Steen, as cited by Finchum, 1961). This approach converts daily cleaning duties to room equivalents by setting 800 square feet of classroom floor space equal to one room equivalent. Different figures are assigned for cleaning gymnasiums, corridors, restrooms, windows, and other areas which require more or less time than the standard 800 sq. ft. classroom. Using the rate of 1.0 room equivalent per hour per custodian, the number of custodians can be found. Steen noted that although this method was useful in Pittsburgh, each district should conduct its own timing experiments to develop appropriate room equivalents. This has advantages over the first method in that it does not require strict division of labor and there are fewer calculations.

The recommended method is considerably easier to calculate, can be used in both large and small schools, and has been widely used for almost forty years. Although it has been modified and renamed the "Diversified Formula," and the "Coddington Formula" (Worrell, 1972), among others, it is believed that M. G. Pattington first developed it in 1946 (Finchum, 1961). We have added part of Nugent and Vicino's (1975) formula to it to obtain what we shall call the "Pattington Formula, Modified."

It is based on the belief that one custodian can satisfactorily service a school containing eight teachers, two acres of maintained land, 15,000 square feet of floor area, 225 students, and eleven rooms. More custodians would be expected to cover night meetings, swimming pools, hand-fired furnaces, and other "extra" responsibilities.

The modified formula is given below. Instructions are provided in detail on the worksheet in Appendix B.

$$\frac{T/8 + L/2 + A/15,000 + S/225 + R/11}{5} + C = \text{Number of Custodians Needed}$$

5

- T = Number of teachers in the building
- L = Number of acres of maintained land
- A = Area of building in square feet
- S = Number of students (actual, not capacity)
- R = Number of rooms
- C = Cafeteria/kitchen factor (Add 0.1 for a cafeteria; add 0.2 for a kitchen)

These methods are intended to serve only as guidelines for staffing. Many variables contribute to the workload and may necessitate more workers. The Alberta Department of Education (1977) and Nugent and Vicino (1975) provided these additional variables which affect the productivity of custodians:

1. School policies with respect to chewing gum or consuming food or drinks in classrooms; wearing of outdoor footwear in classrooms; student clean-up of work areas.
2. Age of school.
3. Building structure, i.e. number of floors; number of stairwells; location, type and area of windows. Is the building made of wood or brick? Is it poorly constructed or well constructed?
4. Type of floor: terrazzo, carpeting, maple, pine, etc.
5. Kind of school: elementary school, middle school, magnet school, etc., and the number of special rooms, such as art, home economics, industrial arts.
6. Knowledge and skill of custodial staff.
7. Quantity and quality of cleaning equipment.
8. Location of building. Schools in industrial and rural areas may be more difficult to keep clean than those in residential areas.
9. Type, area, and utilization of blackboards.
10. Type and arrangement of classroom furniture.
11. Area of sidewalks.
12. Type and condition of heating, ventilating, and air conditioning (HVAC) system, plumbing system, and lighting fixtures.

It is recommended that one begin the custodial staffing process using the Pattington Formula, Modified. Then take into account carefully the other factors that affect workload, and finally consider the current effectiveness of the custodians on your staff. Administrators may find it necessary to hire more custodians or to cut the number of positions. Hopefully you will be able to rest comfortably with the knowledge that your present staff is effectively keeping the school clean and safe.

C. COST STUDY

A necessary step toward improving the O & M program of a school includes analyzing its expenditures. Although many methods of analysis exist, five of the more meaningful and commonly used comparisons were made for the years 1980-81 through 1983-84. The data are found in Table 1: Operations and Maintenance Costs and Personnel Counts.

TABLE 1: OPERATIONS AND MAINTENANCE COSTS AND PERSONNEL COUNTS IN WISCONSIN'S PUBLIC SCHOOLS 1980-1984

	YEAR				Percent change between 1980-81 & 1983-84
	80-81	81-82	82-83	83-84	
O & M Cost As Percent of Current Expenditures	11.6%	13.1%	12.5%	12.4%	+0.8%
O & M Cost in Dollars per Pupil	\$ 321.68	\$ 364.97	\$ 387.83	\$ 415.67	+29.2%
Pupils per O & M Staff*	103.5	100.7	110.9	110.4	+6.7%
O & M Cost per O & M Staff*	\$ 33,322	\$ 36,777	\$ 43,007	\$ 45,906	+37.8%
Mean O & M Cost per District	\$587,974	\$648,890	\$670,914	\$712,473	+21.2%
State Total of O & M Staff*	7,651	7,651	6,764	6,705	-12.4%
State Pupil Count (3rd Friday in September Membership)	792,149	770,666	749,799	740,464	-6.5%

*Staff counts do not include purchased personnel services.

Worksheet #2 in Appendix C is provided for each administrator to calculate his/her district's expenditures for easy comparison with state figures.

The school district annual reports supplied all expenditure data and pupil counts. The cost of operations and maintenance is defined as all expenditures in Functions 253 000 and 254 000 of the General Fund, Fund 10. Current expenditures are defined as all expenditures, Function 000 000, of the General Fund. The Third Friday in September Membership was used as the pupil count since it can be easily determined early enough in the fiscal year for use in preparing the budget.

Data on O & M personnel were taken from the District Support Staff Reports, PI-1289. This personnel count is not completely accurate, however, since some districts have contracted O & M companies to work in their schools. The costs of such purchased services are recorded in Object 300 of the Annual Report and are included in our cost data, but counts of the number of people employed through such agencies are not available. This lack of information makes the Pupil per O & M Staff and the O & M Cost per O & M Staff ratios recorded in Table 1 artificially high.

BREAKDOWN OF EXPENDITURES

To date there has been little research on schools' O & M programs. Although American School and University (AS & U) annually conducts a national, quasi-scientific O & M cost study, the sampling techniques employed and the conclusions reached are suspect. Nonetheless, information can be gleaned from their work for comparison to our data.

Deriso found in AS & U's 13th Annual Study (1984) the following distribution of O & M expenditures for 1980-1984:

TABLE 2: BREAKDOWN OF O & M EXPENDITURES 1980-1984

Item	Year			
	80-81	81-82	82-83	83-84 *
Salaries	41.3%	48.0%	48.6%	46.9%
Heat	13.7%	10.0%	10.0%	10.9%
Other Utilities	19.5%	20.0%	20.7%	21.2%
Other O & M Costs	25.5%	23.0%	20.7%	21.0%

*Data for 1983-84 come from school budgets, not actual expenditure reports.

It must be noted, however, that AS & U did not include O & M capital outlay in its cost analysis, as was done for the DPI study.

In addition, Deriso found the budgeted per pupil cost for O & M in 1983-84 to be \$382.47 nationally, and \$425.70 for the Great Lakes region (IL, IN, MI, OH, MN, WI). O & M costs accounted for 12.5% of the nation's schools' net current expenditures. The latter term, however, does not include expenditures for pupil transportation or annual capital outlay, as it did in the DPI study.

FACTORS AFFECTING O & M COSTS

Since salaries account for such a high percentage of the total cost of O & M, factors affecting the number of people employed and the wages paid them directly affect the total cost of O & M. The previous section on custodial staffing discussed some of those factors.

Other factors may include the presence or absence of unions in O & M staffs, the cost of fuel and other utilities, the age of school facilities, the length of the school year, and the weather conditions of each district.

The size of the building largely determines the cost of an O & M program. The square footage of a building doesn't decrease if the enrollment decreases. Although 64% of the districts in Deriso's study (1984) had a decrease in enrollment in 1983-84, only 22% were able to decrease the number of custodians. He found that custodians were responsible for cleaning an average of 16,841 square feet each. School maintenance workers covered an average of 53,926 square feet each.

The number of students in a district also appears to correlate with O & M costs. In an analysis of Wisconsin's budgeted O & M expenses, Babcock and Rue (1984) found that the cost per student was higher for large districts than for small districts.

SALARY INFORMATION

Studying employees' salaries should be a part of cost analysis. The Educational Research Service (ERS) annually conducts a national survey of wages paid support personnel, including custodians, in public schools. Although no schools with very small enrollments (less than 300) were queried in their study in the fall of 1982, the study does provide administrators with data for comparison with their employee compensation levels.

ERS found the mean of the lowest paid group of custodians, the mean of the middle income group, and the mean of the highest paid custodial group to be \$5.24, \$6.23, and \$7.47, respectively. The data were also broken down by enrollment. One sees from this that the hourly wages increased as student enrollment increased, except in the case of very large schools. See Table 3.

TABLE 3: NATIONAL MEAN OF THE HOURLY WAGE RATE OF MIDDLE INCOME CUSTODIANS, BY ENROLLMENT 1982-1983

	Enrollment				
	25,000 or more	10,000 to 24,999	2,500 to 9,999	300 to 2,499	Total-- All Reporting systems
Mean Hourly Wage Rate	\$6.16	\$6.39	\$6.23	\$6.12	\$6.23

This national mean was an increase of 4.7% over the hourly wage rate for 1981-82.

When the figures were analyzed by geographic area, it was found that the Great Lakes area (IL, IN, MI, OH, WI) had a mean hourly wage rate of \$6.81, placing it above the national mean.

American School and University found that the mean budgeted annual custodial salary for 1983-84 for Wisconsin and surrounding states was \$15,717. The mean budgeted annual maintenance salary was \$19,364. Together the salaries accounted for 6.3% of the budgeted net current expenditures.

APPENDIX A

MANUFACTURERS, ORGANIZATIONS, AND UNIVERSITIES
HOLDING O & M INSTITUTES AND TRAINING WORKSHOPS

Asphalt Roofing Manufacturer's Assoc.
6288 Montrose Road
Rockville, MD 20852

Door and Hardware Institute
7711 Old Springhouse Road
McLean, VA 22102-3474
(703) 556-3990

Environmental Management Assoc.
1019 Highland Avenue
Largo, FL 33540

Facility Management Institute*
3971 South Research Park Drive
Ann Arbor, MI 48104
(313) 994-0200
*A division of Herman Miller Research Corp.

General Electric Lighting Institute
Nela Park
Cleveland, OH 44112
(216) 266-2613
Attn: Janet Allen

Honeywell (for HVAC systems)
Building Service Division
Honeywell Plaza
Minneapolis, MN 55408
1-800-328-5111 ext. 887

International Sanitary Supply Assoc. (ISSA)
5330 North Elston Avenue
Chicago, IL 60630
(312) 286-2575

Johnson Controls, Inc.
507 East Michigan Street
P.O. Box 423
Milwaukee, WI 53201
Attn: Johnson Controls Institute/M-45
(414) 274-4287

The Roofing Industry Educational Institute
6851 South Holly Circle, Suite 100
Englewood, CO 80112
(303) 770-0613

University of Illinois
O & M Division
1501 South Oak
Champaign, IL 61820
(217) 333-1492
Attn: Kip Mecum

UW-Extension
Dept. of Engineering and Applied Science
432 North Lake Street
Madison, WI 53706

UW-Whitewater
800 West Main Street
Whitewater, WI 53190
(414) 472-1105
Attn: Wally Zastrow, Executive
Secretary of W.A.S.B.O.

APPENDIX B: WORKSHEET #1

DETERMINING THE NUMBER OF CUSTODIANS NEEDED IN EACH BUILDING

Find the following for each building in your district. Round each factor to 2 decimal places.

T = How many teachers are there?

L = How many acres of maintained land are on the campus?

A = What is the gross area of the building in square feet?

S = How many students are there?

R = How many rooms are cleaned daily? An average classroom for this model is considered to have 1,000 square feet. Calculate using this base figure.

e.g. A room of 980 sq. ft. = 0.98 of a room.

A room of 2340 sq. ft. = 2.34 of a room.

C = Cafeteria/kitchen factor. Do not use if custodian does not clean these areas.

a) Add 0.1 if there is a cafeteria.

b) Add 0.2 if there is a kitchen.

c) There is no additional calculation if these are not present.

THE PATTINGTON FORMULA, MODIFIED

$$\frac{T/8 + L/2 + A/15,000 + S/225 + R/11}{5} + C = \text{Number of Custodians Needed}$$

NOTE: Calculating the number of custodians is much easier with a memory calculator. Use of the enclosed worksheet will make the process easier for those who do not have one.

WORKSHEET #1 - CUSTODIAL STAFFING, Page 2

		A (Raw Data)	B (Staffing Factors)
Step 1	Number of teachers	T = _____	T/8 = _____
Step 2	Acres of land	L = _____	L/2 = _____
Step 3	Area of building (in square feet)	A = _____	A/15,000 = _____
Step 4	Number of students	S = _____	S/225 = _____
Step 5	Number of rooms	R = _____	R/11 = _____
Step 6	Cafeteria/Kitchen		
	Cafeteria?	If yes, add 0.1	_____
	Kitchen?	If yes, add 0.2	_____
		Sum =	_____
Step 7	Add the numbers in Column B of Steps 1 through 5 above	Sum =	_____
Step 8	Divide the number in Step 7 by 5	<u> </u> 5 =	_____
Step 9	Add the sum in Step 6 to the number in Step 8	<u> </u> + <u> </u> =	_____
Step 10	Rewrite the final figure of Step 9. This is the estimated number of custodians needed.	<u> </u>	

APPENDIX C: WORKSHEET #2

DETERMINING YOUR 1983-84 OPERATIONS AND MAINTENANCE COSTS
FOR COMPARISON WITH STATE AVERAGES

Your sources of data: Annual Report, 1983-84
District Support Staff Report, PI-1289

- A. Determining operations and maintenance costs as percent of current expenditures.

$$\frac{\text{Function 253 000} + \text{Function 254 000}}{\text{Function 000 000 of Fund 10}} \times 100 = \text{O \& M cost in percent}$$

1. Add the amounts for TOTAL OPERATION (Function 253 000, Object 000, p. 27 of Annual Report) and TOTAL OF ALL OBJECTS, MAINTENANCE (Function 254 000, p. 28). Save this figure for use in B and D below.

$$\text{O cost} + \text{M cost} = \text{O \& M cost}$$

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

2. Divide the figure from step 1 by TOTAL EXPENDITURES of General Fund, Fund 10 (Function 000 000, Object 000, p. 32).

$$\frac{\text{O \& M cost}}{\text{Expenditures}} = \underline{\hspace{2cm}} =$$

3. Multiply the figure from Step 2 by 100.

$$\underline{\hspace{2cm}} \times 100 = \underline{\hspace{2cm}}$$

4. This is the cost of your operations and maintenance as a percent of your total expenditures. Compare it with the averages for the state in Table 1.

- B. Determining your operations and maintenance cost in dollars per pupil.

$$\frac{\text{Function 253 000} + \text{254 000}}{\text{Third Friday in September Membership}}$$

1. Use the figure from Step 1 in A above, total cost of operations and maintenance. Divide it by Line 1 of p. 67 of the Annual Report, Third Friday in September Membership.
2. Round to the nearer dollar.
3. This is the cost of your operations and maintenance in dollars per pupil. Compare with the averages for the state.

C. Determining your pupils per operations and maintenance staff ratio.

Third Friday in September Membership
Plant Operation Personnel + Plant Maintenance Personnel

1. Plant operation and maintenance personnel: Add the figures in column 6 of the District Support Staff Report, line 937 and 939.

"O" personnel, male + "O" personnel, female + "M" personnel, male + "M" personnel, female = Total O & M personnel

_____ + _____ + _____ + _____ = _____

2. Divide Third Friday in September Membership, p. 67 in the annual report, by Total O & M personnel.

$\frac{\text{Membership}}{\text{Total O \& M personnel}} = \underline{\hspace{2cm}} =$

3. Round to one decimal place.
4. This is your pupils per O & M staff ratio. Compare with the averages for the state.

D. Determining your operations and maintenance cost in dollars per operation and maintenance staff member.

Function 253 000 + 254 000
Plant Operation + Plant Maintenance Personnel

1. Use the figure from Step 1 of A. Divide by the figure from Step 1 of C.

$\frac{\text{O \& M Cost}}{\text{O \& M Personnel}} = \underline{\hspace{2cm}} =$

2. Round the figure to the nearer dollar.
3. This is your operations and maintenance cost in dollars per operations and maintenance person. Compare with the averages for the state.

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